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ARI Research Note 90-89

# Second Year Report: Psychological Analyses of Courageous Performance in Military Personnel

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**S. Rachman**

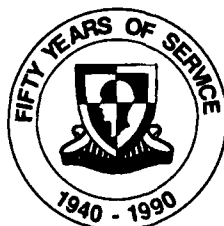
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<p>This research reports on the second year of the project to identify psychological markers of courageous military performance. Findings indicate that means and standard deviations of heart rate responses of 28 bomb disposal operators during a lab stress test are similar to patterns recorded for previous groups of operators. Individual profiles were constructed for each operator. Physiological and psychometric data for the operators are internally consistent, but weakly correlated with each other. Preliminary analyses indicate that, as expected, low anxiety and heart rate activity is associated with superior performance in the field. Moreover, decorated operators responded stably and without anxiety during pre-tour stress tests. Early results on optimism and courage form no clear pattern.</p>					
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PSYCHOLOGICAL ANALYSES OF COURAGEOUS PERFORMANCE

IN MILITARY PERSONNEL

Second Year Report

Principal Investigator:

Professor S. Rachman

The purpose of the project is to identify psychological markers of courageous military performance. In addition, an extension was initiated late in 1988, with the aim of testing Seligman's hypothesis that an optimistic explanatory style is a pre-condition for courageous performance.

The major study is prospective, and involves the collection of data on laboratory stress reactions and personality before the bomb-disposal operators of the Royal Army Ordnance Corps go on a tour of operational duty in Northern Ireland. The main aim is to predict which operators will act courageously or perform at a superior level during their tour of duty. Successful predictions will have practical benefits and help to elucidate the nature of courage.

Psychometric and psychophysiological data were collected from 28 operators of the RAOC. Their progress and performance under operational conditions are being tracked. Full psychometric data were included in the First Letter Report, and the psychophysiological data were included in the Second Letter Report. The means and standard deviations of the heartrate responses during the laboratory stress test are similar to the patterns recorded from the two groups of operators who were

studied in the original projects, previously reported. (Table 1a).

So far, 19 of the operators have completed a tour of duty, two have been transferred and one operator was killed in an explosion. Two are presently on duty. In addition, we have obtained information about the explanatory style of 13 of the operators, and are making arrangements to test the remainder of the sample, some of whom are in remote parts of the world.

The quantitative analysis of the pre-tour information has been completed. As noted, the performance of these operators during the laboratory testing is comparable to that recorded from two military samples studied early in the overall project. A correlation matrix was calculated, and showed that there are significantly positive correlations between the psychometric measures. The correlations between the physiological data are also significantly positive. However, the correlations between the psychometric and physiological data, in particular those between heartrate and self-reported anxiety, while positive, are low, mainly in the range of 0.20 to 0.25.

The 28 operators taking part in the present study consisted of 14 novices (no previous experience in Northern Ireland) and 14 veterans, and we found no differences between these groups prior to entering the laboratory stress task (Tables 1 and 1a). On the measures of anxiety, the scores reported by the novices were marginally, but non-significantly, greater (Fig.1).

Individual profiles have been constructed for each of the 28 bomb-disposal operators and 8 examples are included in Appendix I. These profiles will be used in assessing the relationship

Table 1: The mean anxiety scores, and total number of symptoms, reported by the two groups, before and after the stress test.

<u>Novices</u>	<u>x</u>	<u>s.d.</u>
Pre-total	19.07	18.02
Pre-number	7.36	6.46
Post-total	25.0	25.02
Post-number	6.79	3.38
Total anxiety	157.4	87.2

<u>Veterans</u>	<u>x</u>	<u>s.d.</u>
Pre-total	11.00	7.93
Pre-number	4.00	2.73
Post-total	20.20	19.29
Post-number	6.27	4.16
Total Anxiety	137.7	127.8

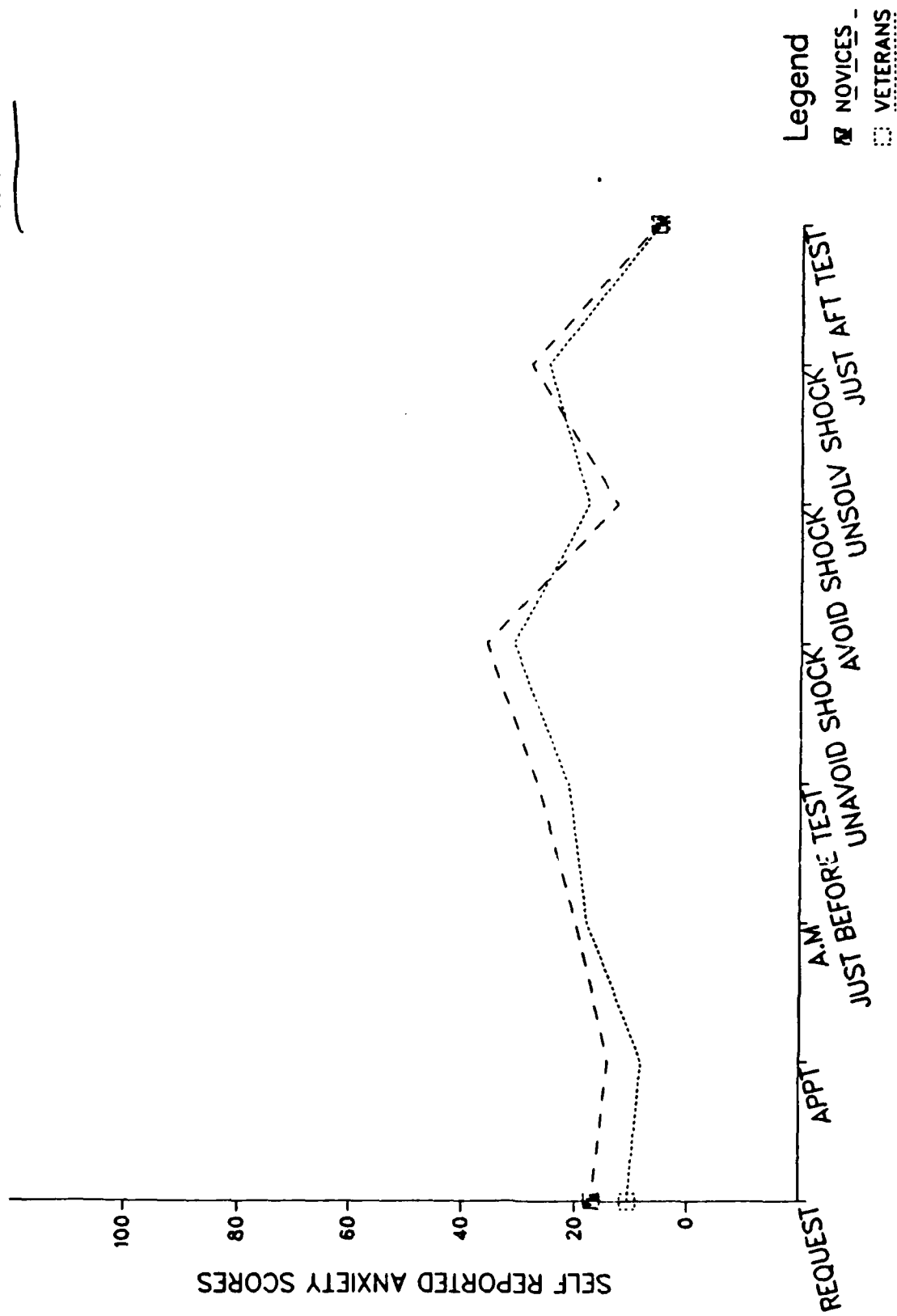
Table 1A: The scores did not differ (two-tailed t-tests).

	t	p
Pre-total	1.54	0.141
Pre-number	1.80	0.089
Post-total	0.58	0.570
Post-number	0.37	0.715

FIGURE 1: The total anxiety scores of the novices and veterans at each stage of the laboratory testing.



Fig. 1.



between reactions to laboratory stress and operational performance. A formal quantitative analysis of these relationships must of course await the collection of all of the operational information, but the following qualitative analyses are not without interest.

The emerging pattern is consistent with expectation, and the records of the decorated soldiers are precisely what one would predict--low anxiety and low autonomic reactivity under stress. The profiles of those who performed below average or failed, show greater reactivity and anxiety. The exception to the pattern is Subject No.2 who had an excellent tour even though he showed mild anxiety and a high heartrate during the stress test.

The first three records are those of operators who received end-of-tour reports from their superior officers that were well above average.

The second set of profiles are the laboratory records of two operators whose superior officers thought they had not performed up to standard during their tour of duty. Also included is the profile of an operator who failed the pre-operational tour training course.

The profiles of the two operators who received decorations for courageous performance show comparatively low heartrate responsiveness during stress and little or no self-reported anxiety during stress. They had very low scores on total anxiety. The mean for the total group of 28 operators is 147.5, and the two decorated operators had scores of 58 and 59 respectively.

The qualitative analysis was taken a step further by setting up a set of predictor variables that allow us to make a prediction about whether a particular operator will perform courageously or not. Using our previous experience of the laboratory test results, we expect that operators who show low heartrate responsiveness during the stress test are more likely to show courageous performance.

The operators were divided into two groups that were thought to hold the greatest promise of providing predictive accuracy. On the basis of their performance before and during the laboratory stress tests, four operators were placed in the "unlikely group" and two were placed in the "probably courageous group", on the following basis. Those subjects whose heartrate during the stress test was at least 1/2 standard deviation above the mean and whose total anxiety score was 1/2 standard deviation above this mean, were placed in the "unlikely" group. At the other end of the scale, the two operators whose heartrate responses were at least 1/2 standard deviation below the group mean and whose total anxiety scores were at least 1/2 standard deviation below the group mean for that measure, were placed into the "probable" group. This classification produced the following results. Of the four operators who fell into the "unlikely" group, two were reported by their superior officers as having performed below the average during their operational tour, one was rated as excellent, and one failed to pass the highly demanding training course that operators have to complete immediately before starting an operational tour. On the other side, both of the operators who were classified into the

"probable" group received "excellent" tour reports from their superiors, and one was described as behaving "courageously". It is also worth mentioning that the two operators who received decorations for courageous performance both had laboratory stress anxiety scores that were at least 1/2 standard deviation below the mean. The operator who reported the largest total anxiety score during the laboratory stress test, nearly two standard deviations above the mean, was the soldier who failed the pre-operational, realistic test. The person who reported the highest degree of anxiety during the stress test performed below average during his operational tour. Five of the six operators who received outstanding reports after their tour of duty were substantially less anxious or had lower heartrate responses during the laboratory stress test, or both. It will be appreciated that these are merely qualitative predictions and that the formal predictive validity of the stress test must await the collection of the data from the remaining subjects.

#### Explanatory Style and Courage

We have analysed the first 13 ASQ's, and these early results are set out in Table; 2,2. Of the 6 operators with an optimistic explanatory style, indexed by (CPCN) scores of 5+, 3 had excellent/above average tours, and 1 below average (2 are still to go). Two of those who had pessimistic scores (below 1.17) had below average tours, one average, and one above average. One of the operators with an average CPCN score failed and the other had an average tour. As is evident, no pattern has emerged at this early stage, but the data do not contradict the hypothesis that

TABLE 2.

November 14, 1988

(T.2.) CPCN Scores and End-of-Tour Report Grading (n = 13)

6 soldiers with CPCN above 5

<u>Subject No.</u>	<u>Initial</u>	<u>Grade</u>
2	T	Excellent, especially calm
4	WD T	Below average
6	R	To come
9	E	Decorated for bravery
11	Mc	Above average
13	B	To come

5 soldiers with CPCN below 1.17

<u>Subject No.</u>	<u>Initial</u>	<u>Grade</u>
3	J	Above average
5	S	Below average
7	S	To come
8	B	Below average
10	C	Average

2 soldiers with CPCN between

<u>Subject No.</u>	<u>Initial</u>	<u>Grade</u>
1	T	Failed
12	C	Average

November 7, 1988

TABLE 2a

Subject No.	Name		CPCN	Tour
1	C.	IOC	3.50	Failed
2			+ 8.3	Especially calm, excellent
3		nes	0	Above average
4			+ 5.5	Below average
5			-0.50	Below average
6			+5.17	To come
7			-1.00	To come
8			1.17	Below average
9			+5.0	Decorated
10			0.17	Average
11			+5.17	Above average
12	T	IOC	3.17	Average
13	D.		+6.83	To come

there is a connection between an optimistic style and courageous behaviour. The sub-scales, and their relations to courage, have yet to be analysed.

Discussion The stress reactions of this group of 28 bomb-disposal operators <sup>are</sup> comparable to that of earlier groups. The physiological and psychometric data are internally consistent, and are correlated positively, but weakly, to each other. The veterans and the novices in the present group of 28 officers showed no pre-test differences on physiological responsiveness or psychological reactivity. It is too early to quantify the relationship between pre-tour performance under stress and operational performance, but the preliminary qualitative analyses indicate that the results are in line with expectation: low anxiety and heartrate reactivity during laboratory stress is associated with superior performance in the field. Moreover, both decorated operators had responded stably and non-anxiously in their pre-tour stress tests. The early results on optimism and courage form no clear pattern, but do not contradict the postulated connection between the two variables.

#### Plans.

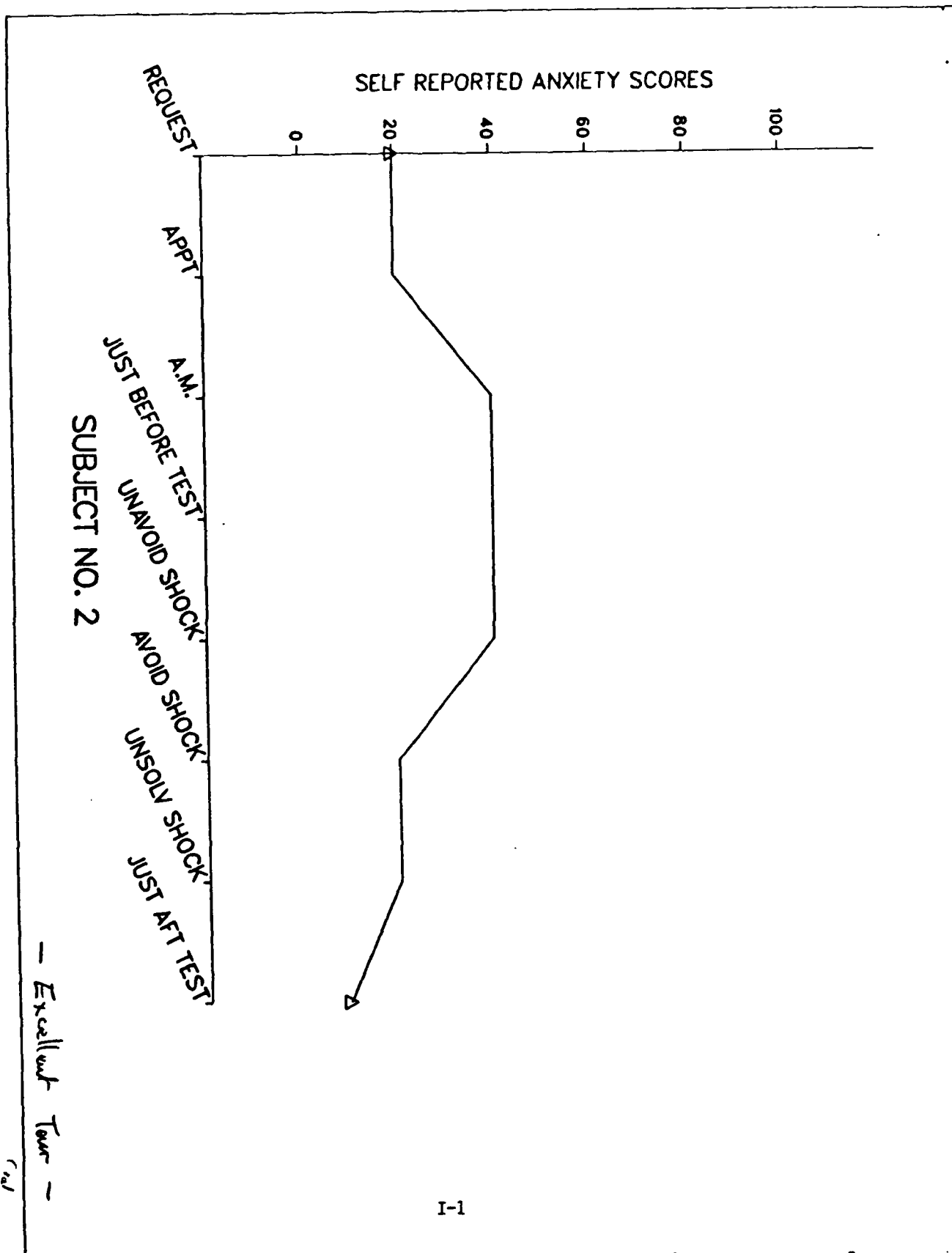
The collection of the remaining reports of the operational performance of the operators will continue, and will be followed by a quantitative analysis of the relationship between the pre-tour psychological and physiological information in relation to operational performance. The performance of these remaining operators will be tracked in the usual manner. In addition, we

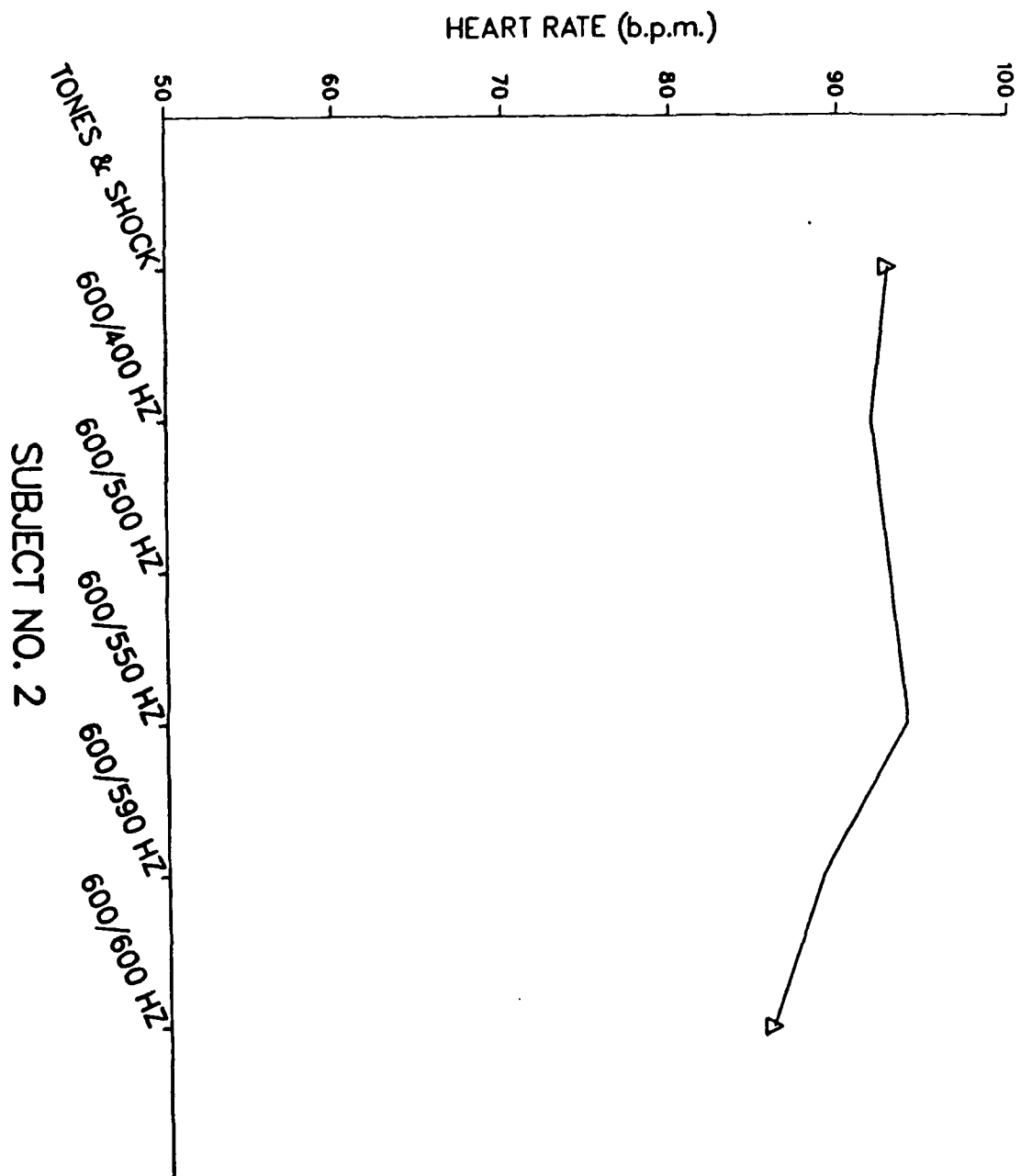
plan to complete the collection of information about the explanatory style of the bomb-disposal operators, and to relate this to the information on the pre-tour reactions to stress, and operational performance in the field.



## APPENDIX I

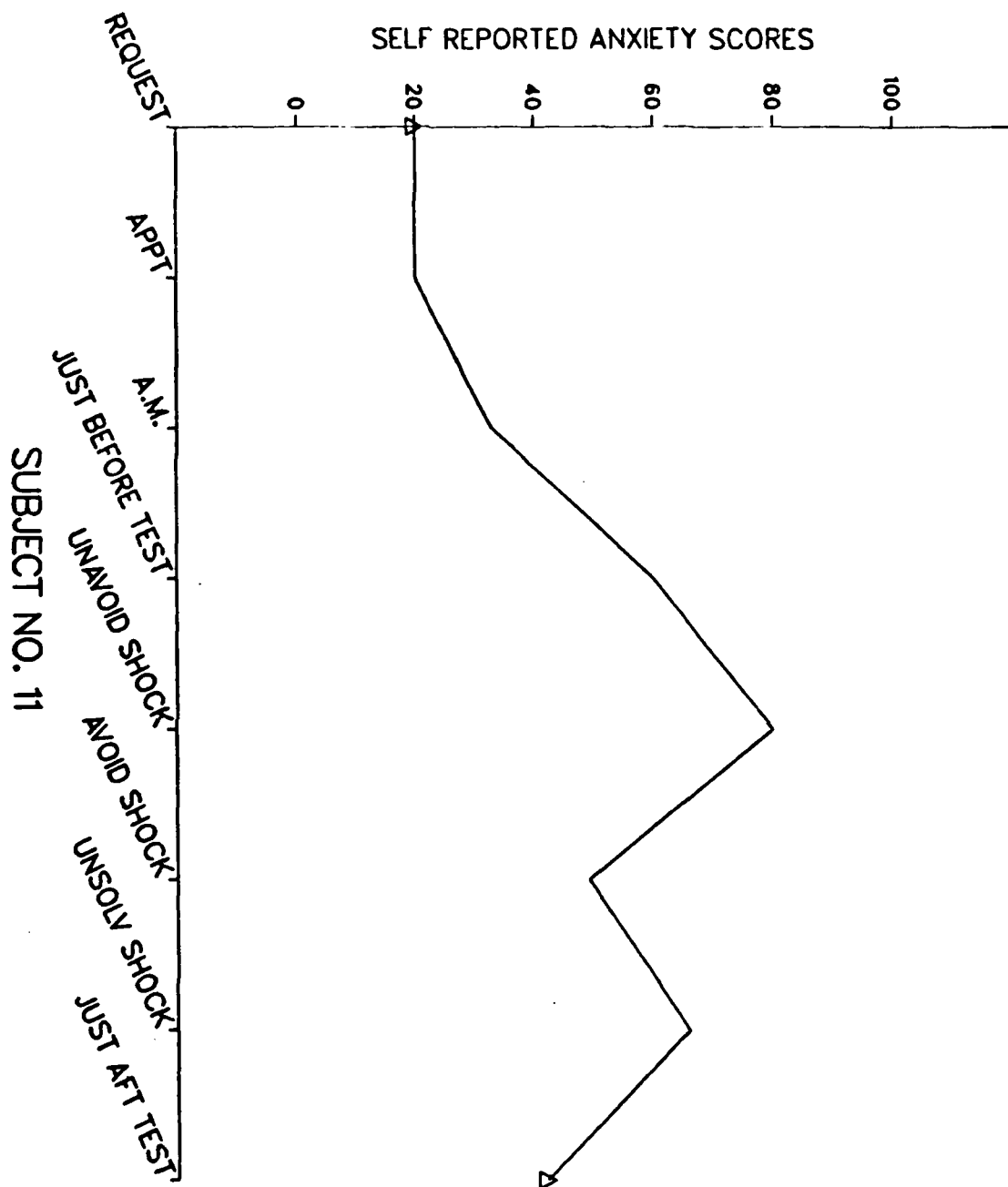
- A. Individual profiles of three bomb-disposal operators whose performance on operational tour was rated by superior offices as excellent. The profiles consist of (1) self-reported anxiety before, during and after the laboratory stress test, and (2) heartrate during the test. The operators are subjects 2, 19 and 20.
- B. Profiles of two operators (subjects 16 and 22) whose operational performance was rated as below average, and subject 11 who failed the pre-operational test course.
- C. The profiles of two operators (subjects 24 and 28) whose performance was excellent and who received a decoration for gallantry.



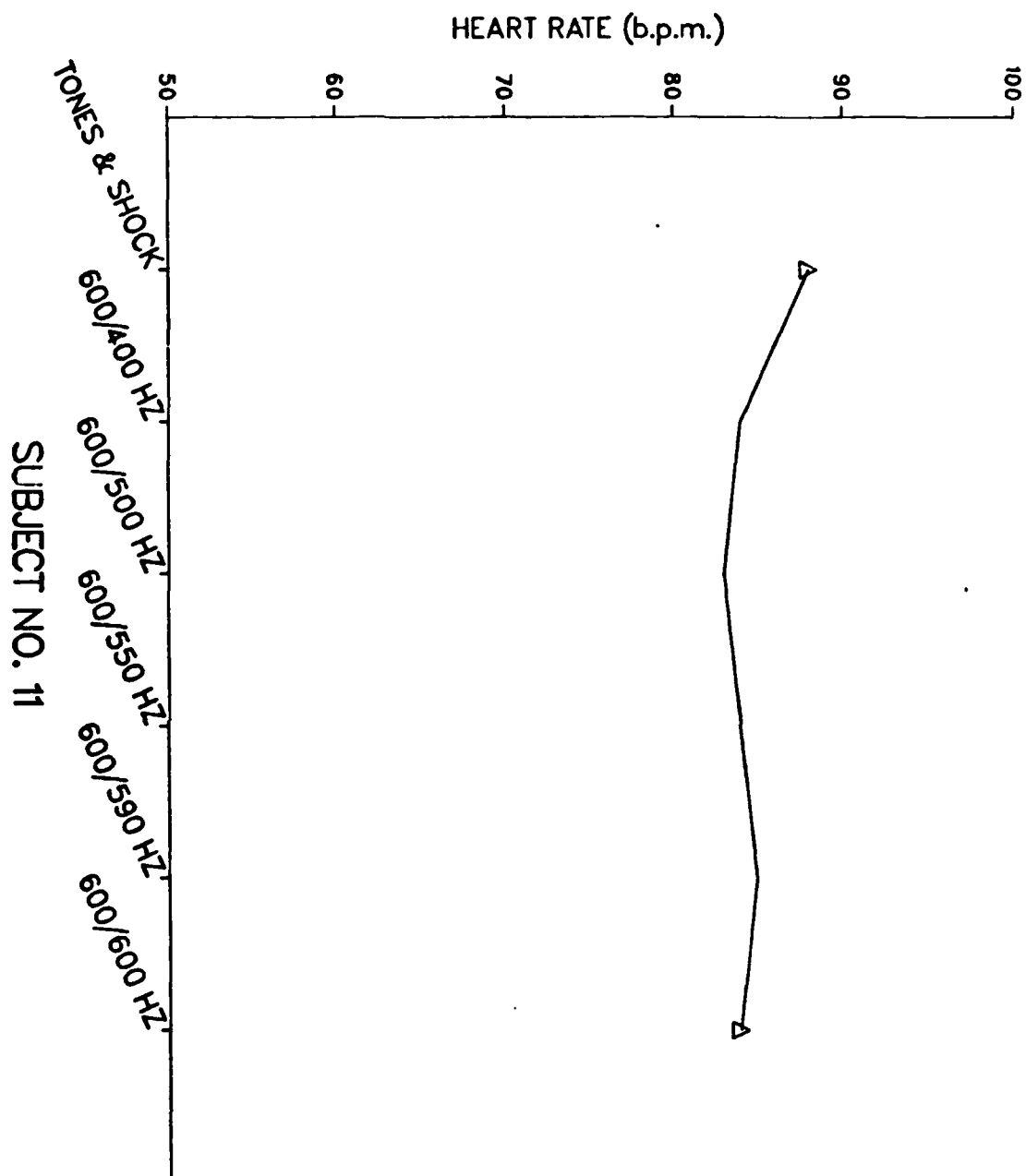


SUBJECT NO. 2

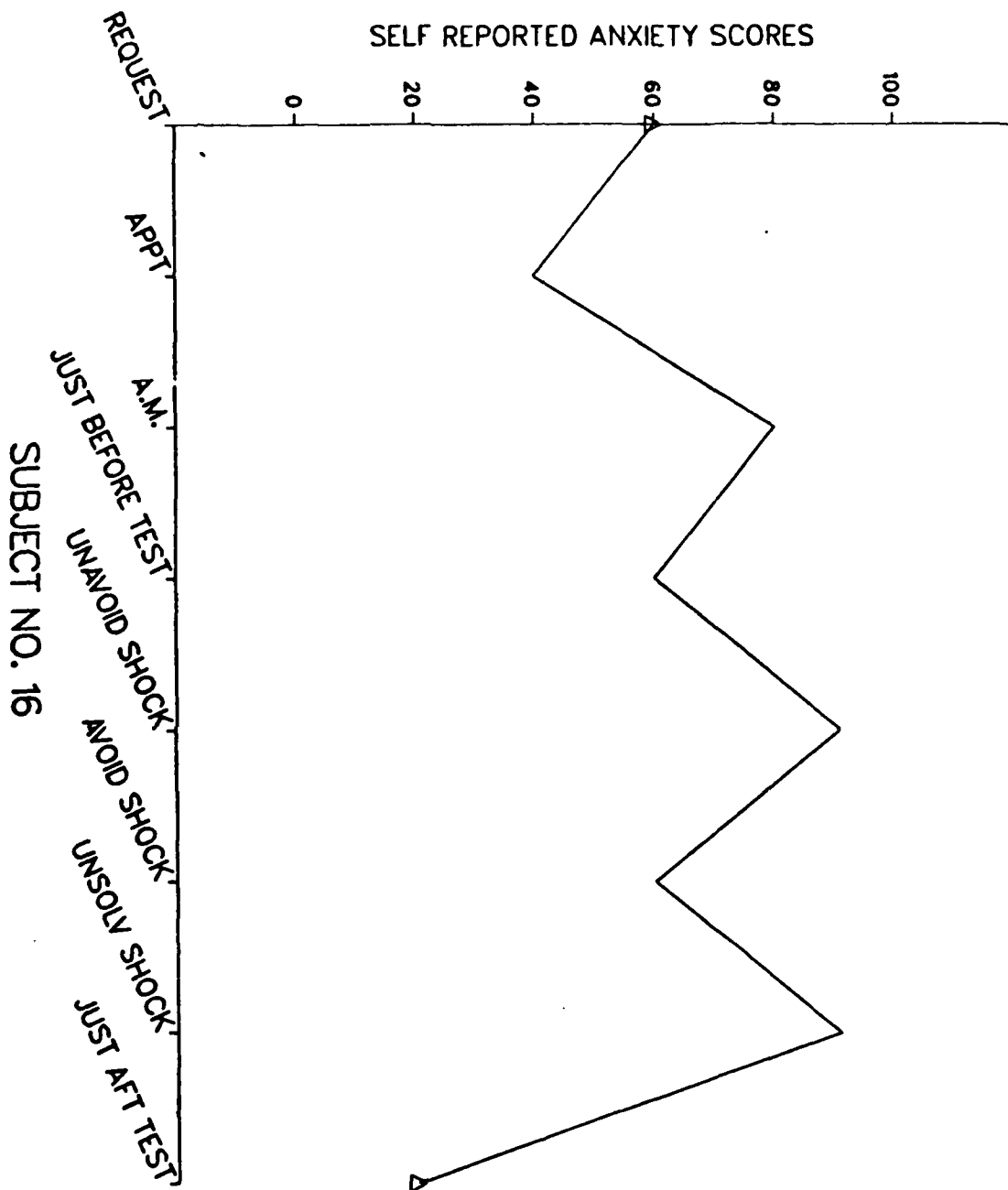
— Excellent Tones —



- FAILURE -

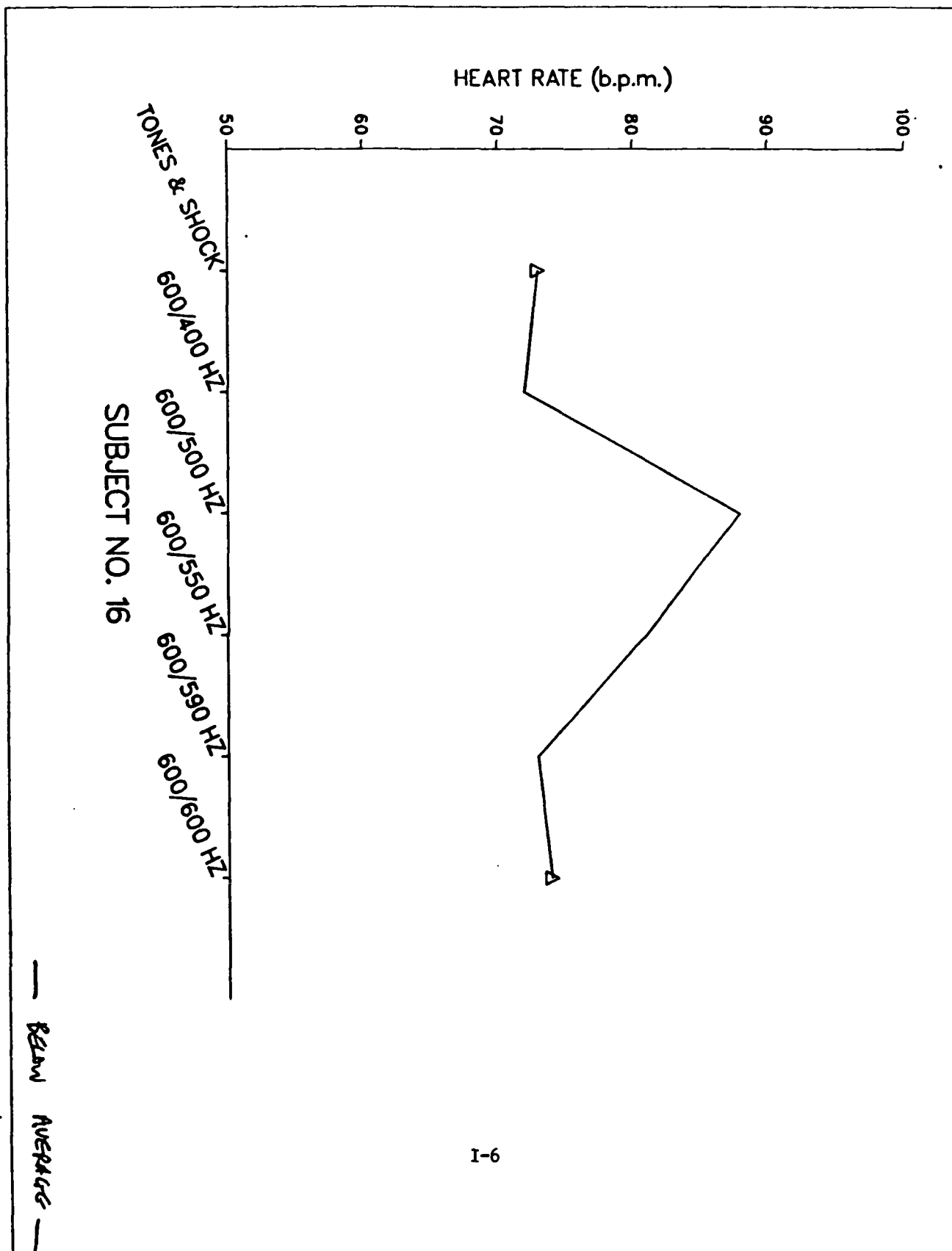


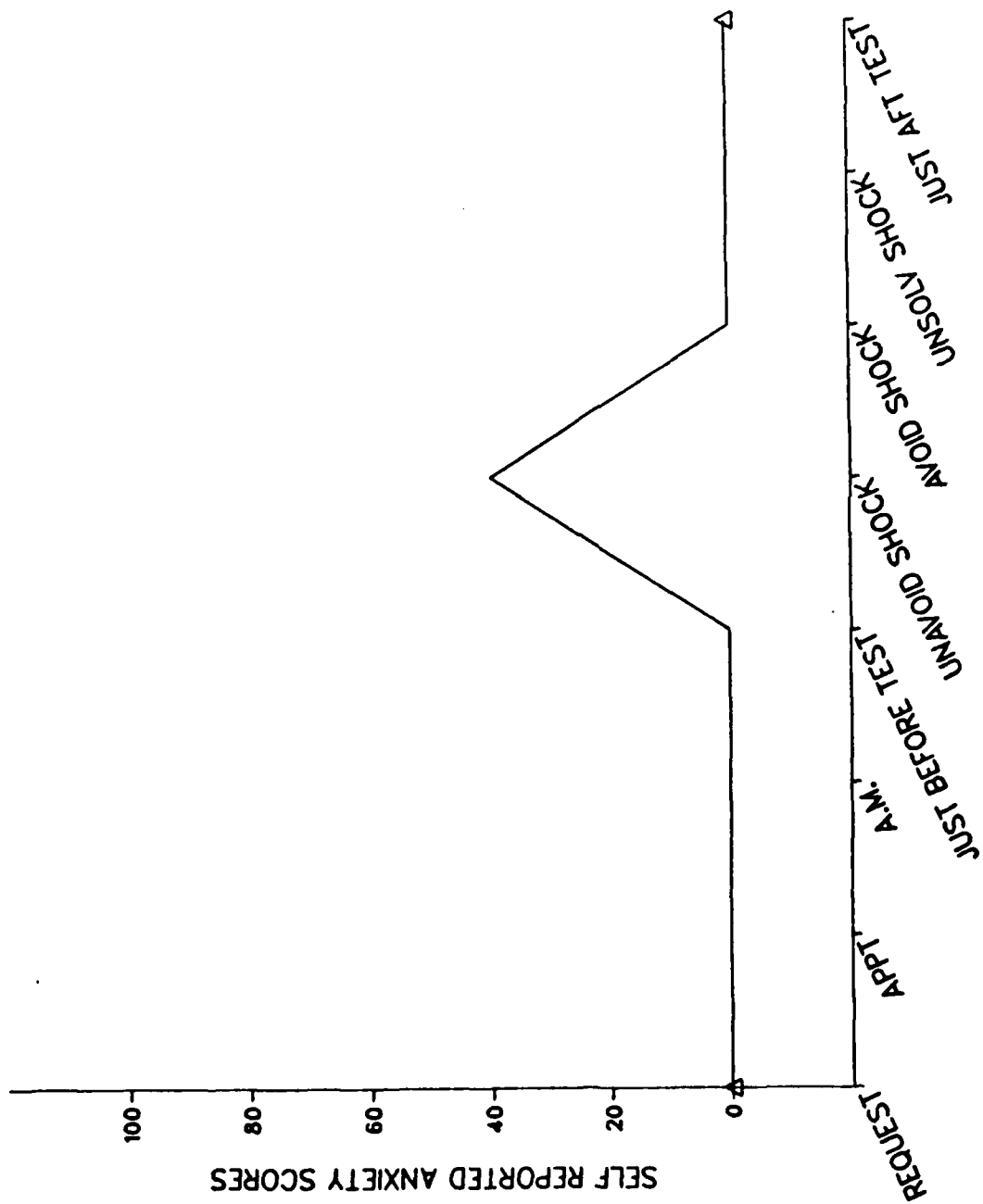
— Failure —



SUBJECT NO. 16

- BELOW AVERAGE -





SUBJECT NO. 19

— EXCELLENT TOUR —



— EXCELLENT TOUR —

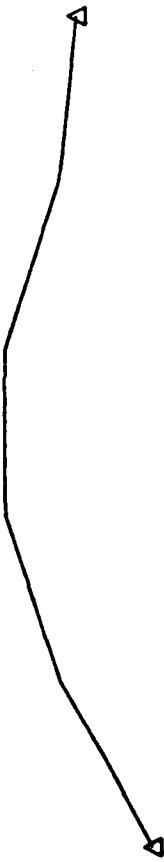
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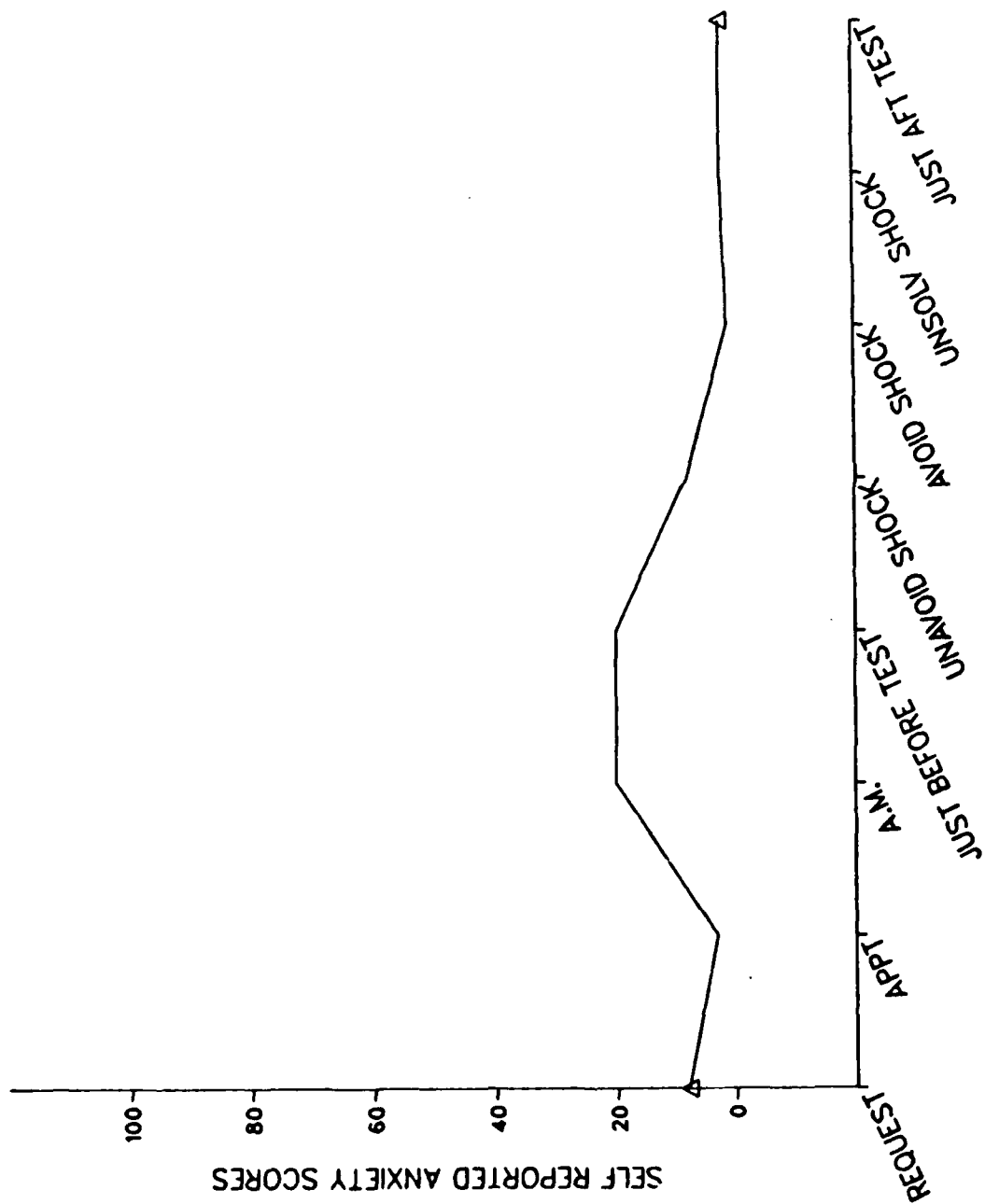
TONES & SHOCK  
600/400 HZ  
600/500 HZ  
600/550 HZ  
600/590 HZ  
600/600 HZ

8-I

HEART RATE (b.p.m.)

100  
90  
80  
70  
60  
50



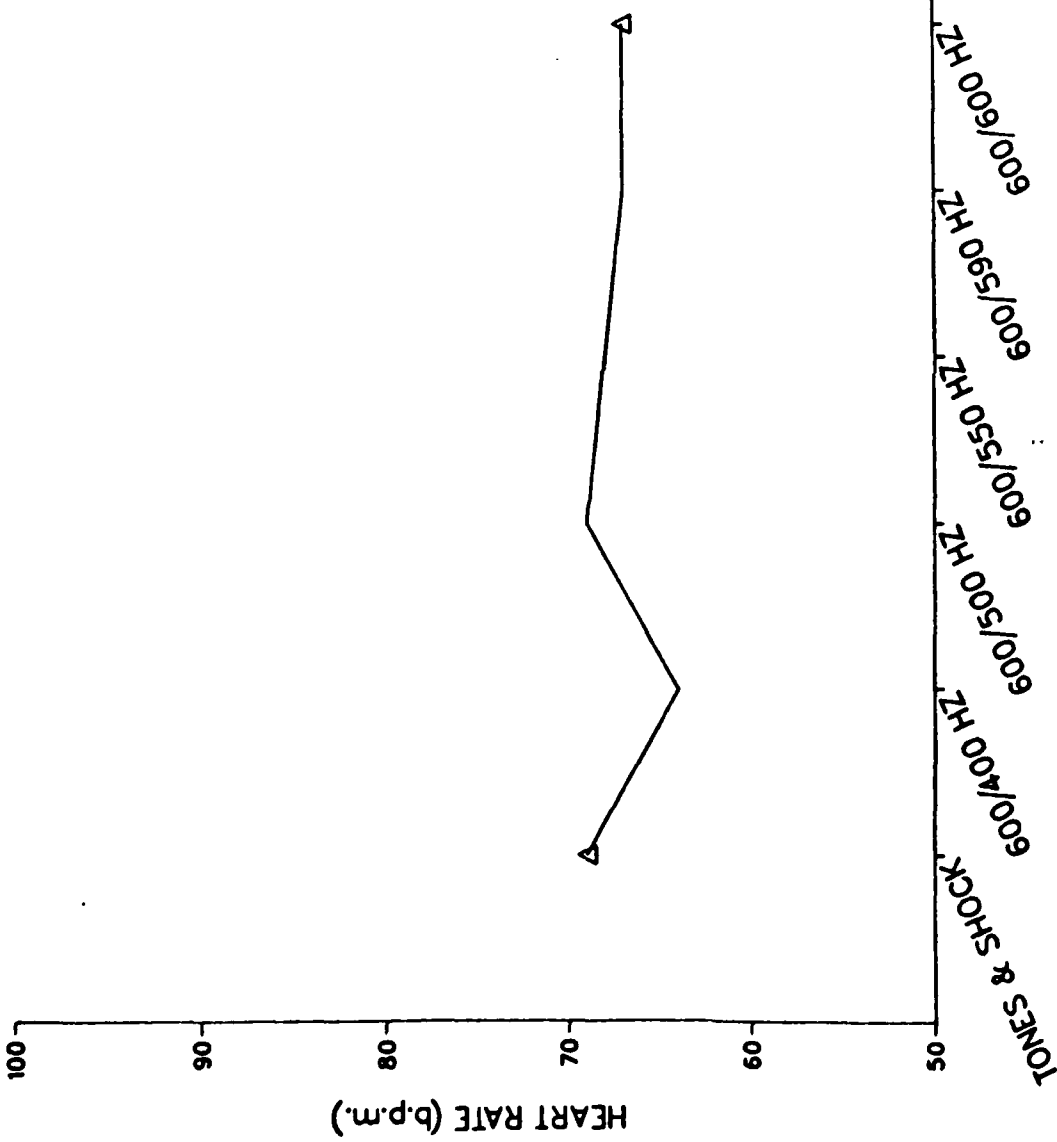


SUBJECT NO. 20

— EXCELLENT TOUR

I-10

- EXCELLENT TOUR



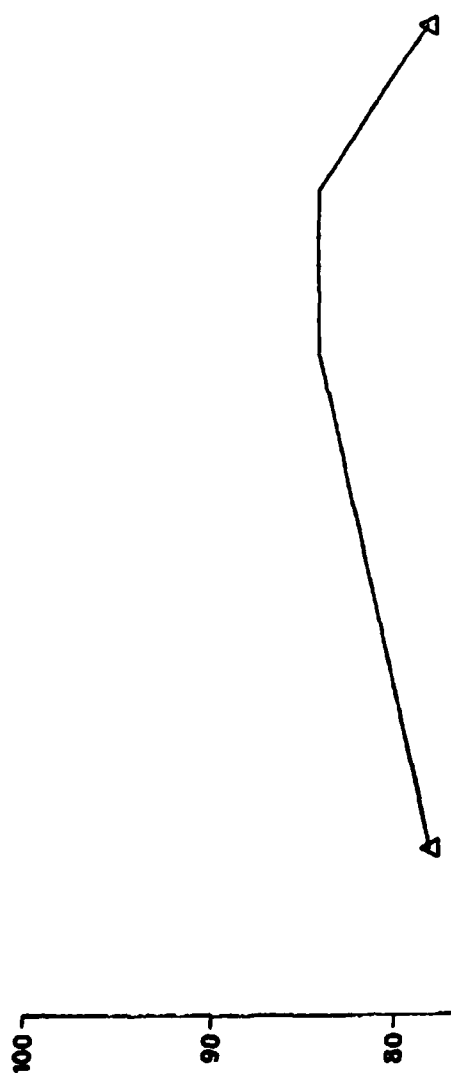
SUBJECT NO. 20

- BELOW AVERAGE -

SUBJECT NO. 22

TONES & SHOCK  
600/400 HZ  
600/500 HZ  
600/530 HZ  
600/590 HZ  
600/600 HZ

HEART RATE (b.p.m.)



SELF REPORTED ANXIETY SCORES

100  
80  
60  
40  
20  
0

REQUEST

APPT.

A.M.

JUST BEFORE TEST

UNAVOID SHOCK

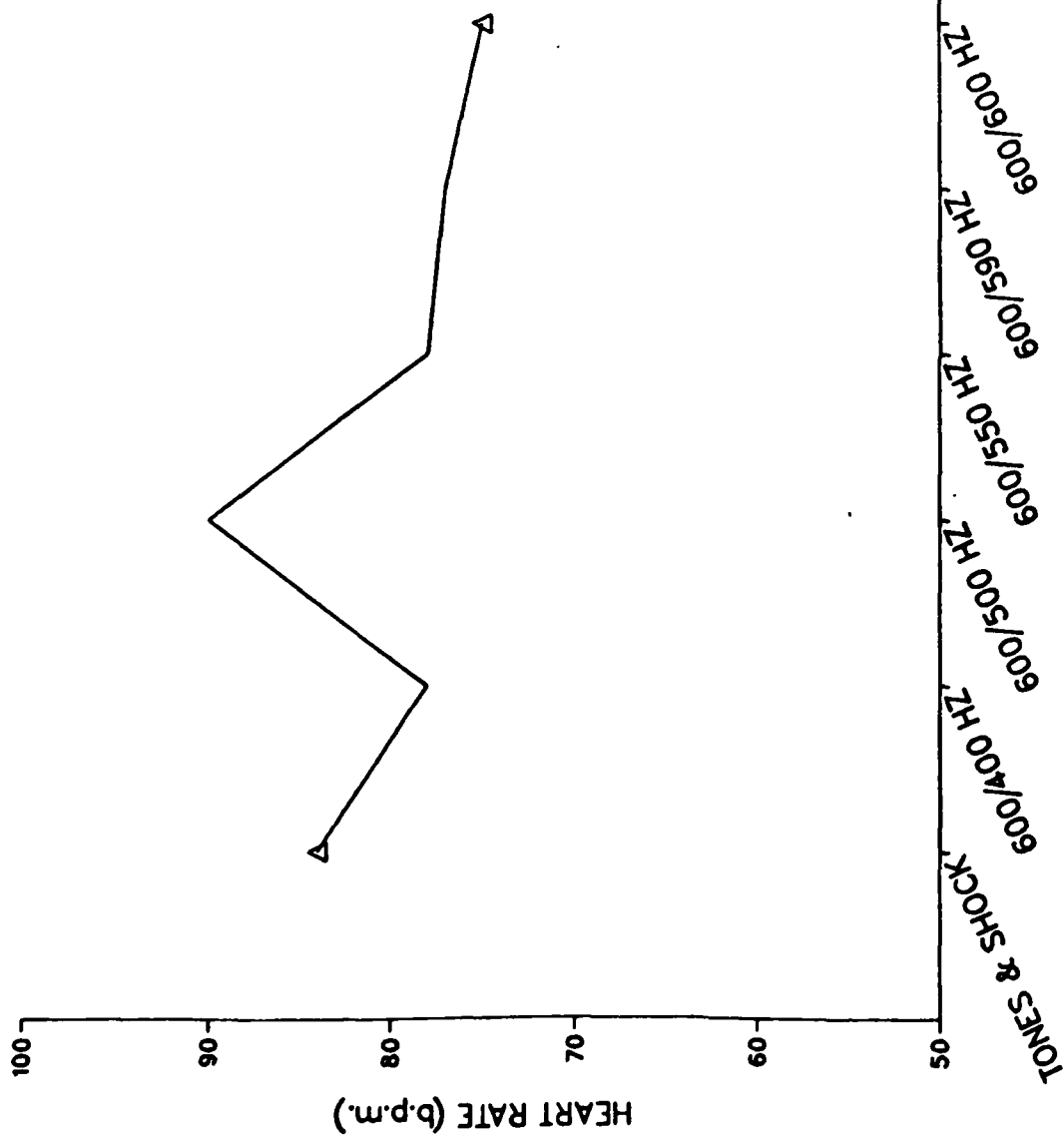
AVOID SHOCK

UNSOLO SHOCK

JUST AFT TEST

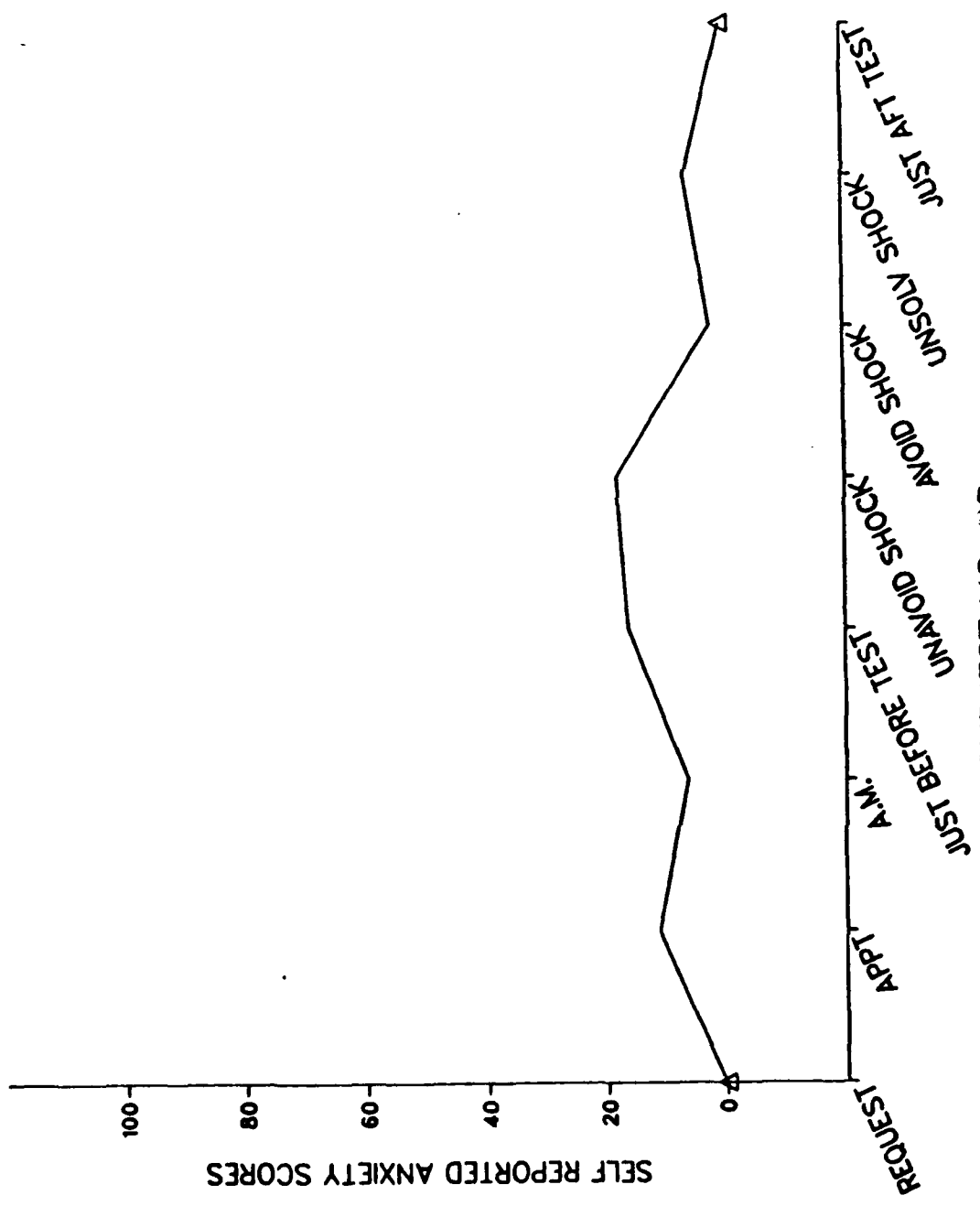
SUBJECT NO. 24

EXCELLENT (DECORATED)



SUBJECT NO. 24

EXCELLENT (DEORATED)



SUBJECT NO. 28

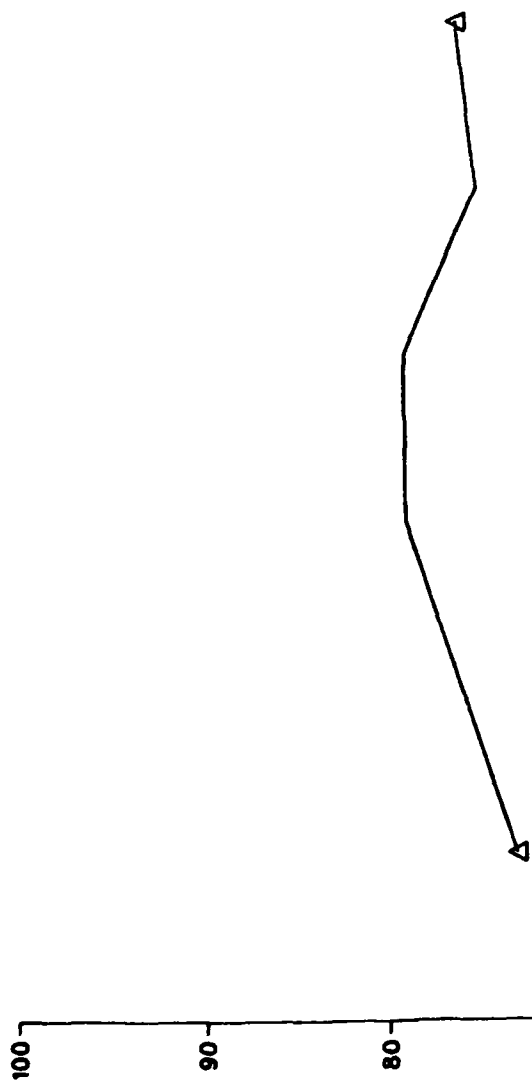
EXCELLENT (DECORATED)

EXCELLENT (DECORATED)

SUBJECT NO. 28

TONES & SHOCK  
6000/400 HZ  
6000/350 HZ  
6000/350 HZ  
6000/350 HZ  
6000/600 HZ

HEART RATE (b.p.m.)



I-15